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ABSTRACT

The study investigated the elements of font size and line spacing in World Wide Web menus for both a scrolled and not scrolled condition with a sample of undergraduate university students. Subjects were 185 students enrolled in 13 section of educational technology preservice teacher courses at the University of Northern Colorado. Students were asked to rank their preferences of four distinct Web menu screens. The four screens included these combinations: default font, double-spaced; large font, double-spaced; default font, single-spaced; and large font, single-spaced. The screens were adapted for two additional conditions: long menus (scrolled) and short menus (not scrolled, designed to be fully viewed on one screen). The content of the menus was lists of endangered species. Results indicate that users prefer large fonts and double line spacing in both scrolled and not scrolled treatments. (MES)

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WEB-BASED MENUS: FONT SIZE AND LINE SPACING PREFERENCES

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Abstract

An abundance of books, articles, and Web sites are available to support novice designers in the creation of effective Web pages. Unfortunately, a review of these materials reflects an absence of research to support many of these design guidelines. While some of the suggestions offered are based on empirical research, all too often this research was conducted in simulated, print-based environments (Grabinger & Amedeo, 1985). In addition, conclusions are frequently based on investigations of older technologies, such as monochrome and low resolution monitors, that are non-representative of current learning environments (Hannafin & Hooper, 1989).

Increasing emphasis on Web-based delivery systems makes it imperative that research be conducted to establish (or confirm) guidelines that are appropriate for current media and that support end users. While the content of Web delivery is critical to the learning outcomes, visual appeal can be equally important as a factor in learner motivation (Keller & Burkman, 1993). This study is a first attempt to describe user preferences in font size and line spacing of Web-based menus. This study investigated the following two research questions.

- Given a non scrolled menu list, does font size or line spacing affect user preference in a CRT displayed Web menu?
- Given a scrolled menu list, does font size or line spacing affect user preference in a CRT displayed Web menu?

Literature Review

Many principles of Web page design have been transferred directly from previous research in print or television. Grabinger (1989) notes that recommendations concerning typographic screen design elements such as line spacing, line length, leading, size of letters, font characteristics, and case of letters are frequently based on folklore and practice in the visual arts. Citing Lynch, Rimer (1996) points out that current graphic design schemes for CRT displays often "emulate many aspects of the style and organizational conventions of paper documents" (p. 6). In a summary of an analysis of the literature on the use of color in screen design, Misanchuk and Schwier (1995) caution instructional designers against generalizing from research that was (a) conducted on older and/or obsolete equipment, (b) based on results from different display media and transferred to video display terminals, (c) not sufficiently similar to tasks performed during teaching or learning, and (d) did not specify intended use of the screen display. This study was predicated on the assumption that the same advice applies equally well to other screen design considerations such as type, font size, and line spacing for Web pages.

Winn (1993) offers the instructional message designer extensive guidelines which are based on the typography research of Miles Tinker (carried out between 1922 and 1967). Principles of type size recommended by Winn include using 10 point type in 19 pica lines set with two to four point leading for optimal legibility. These suggestions have been taken directly from print-based media for application in computer screen design. While these may turn out to be appropriate guidelines (Hartley, 1987), there is currently little empirical research to support the recommendations.

Chen and colleagues (1996) conducted a review of the literature and determined that most of the research on type size pertains to print and television screen presentation, with very little research on computer screens in general or font size in particular. Their research examined the effects of font size on readability (measured by comprehension) and user preference in a hypertext computer-based instruction (CBI) environment. Results of the study indicated that readers lacked satisfaction with font sizes of 10 and 12 points and clearly preferred text of size 14 and 16 points.

In reviewing the literature for this study, few studies were found concerning differentiation of textual purpose in Web screen design; however, Steinberg (1992) discusses the various functions of menus in computer-based instruction, ultimately noting that "the purpose of a menu is to provide information and to make retrieval as simple and efficient as possible for the intended users" (p. 7), by taking into account user characteristics and the nature of the task(s). Some researchers (Coll, Coll & Nandavar, 1993; Grabinger, 1989) have begun to look to the Gestalt psychologists for guidance in understanding how a learner's perceptions of screen organization and design

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affect his/her preferences and ability to complete learning tasks. Grabinger (1989) points out that it is the examination of combinations of textual elements that will help us develop design guidelines that will positively affect learner cognitive processes. An example of such research is the 1993 study by Coll et al. which found that the physical layout of screen menus, while still an important design consideration, was less crucial to the learning task than the conceptual layout (e.g., categorical or alphabetical).

Welsh, Murphy, Duffy and Goodrum (1994), in an investigation of link display strategy and link density within a hypermedia learning environment, found that users reported increased favorable ratings on ease of use when submenus were incorporated in the page design (in white area[s] outside the body of text) compared to iconic and textual link indicators placed within the text. "This finding may be attributable to the added information provided in each submenu which described the source and tone of each elaboration. Perhaps textual as opposed to iconic cues to elaboration type allow the learner to more easily discern the link destination, thus reducing cognitive effort" (pp. 32-33).

Leader and Klein (1996 investigated the effects of search tools and learner cognitive styles on performance in searches for information within a hypermedia database. Results indicated that field-independent learners performed significantly better than field-dependent learners using an index/find search tool. This finding led to a recommendation that designers of multimedia materials consider learner preferences. They also suggest further study of cognitive style factors in the use of hypermedia as they may relate to the formulation of criteria for interface tool design.

There may be a difference in user preference for font sizes in Web-based environments depending on the specific purpose or placement of the text. It is possible that preferences may differ for a body of text as opposed to menu text on a Web page. This study investigated the combined elements of font size and line spacing in Web menus for both a scrolled and not scrolled condition with a sample of undergraduate university students.

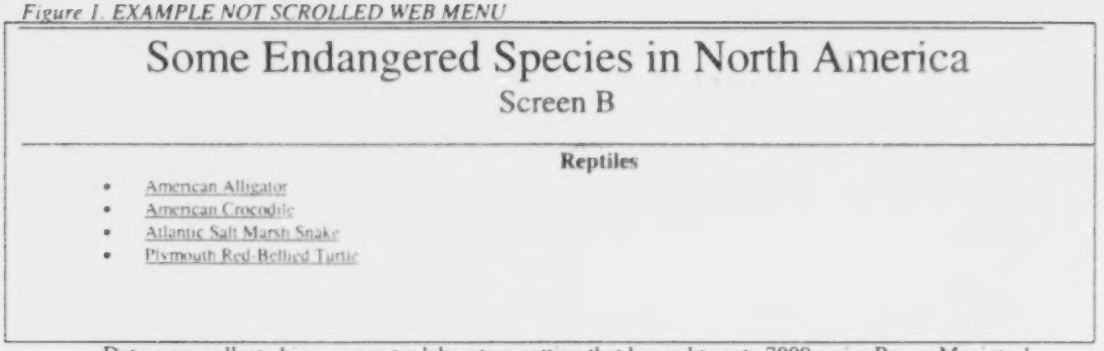
Sample and Methodology

The subjects were 185 university students enrolled in 13 intact sections of ET201, Technology in Education, and ET301, Educational Technology Applications. These are required, undergraduate preservice teacher technology courses at the University of Northern Colorado. Participants included 140 females and 45 males. All but two participants were native English speakers. The average age was 23, with a range from 18 to 51. Sixty percent of the subjects rated their Internet use as at least six hours or more per week; only five subjects responded that they spent no time using the Internet. A large majority of the subjects (82%) reported that they were comfortable using a computer.

Course instructors (graduate students in the Educational Technology program) were asked to volunteer their classes for this study. A total of 13 classes participated. Four different researchers administered the scripted treatment over a consecutive five-day period. Students were asked to rank their preferences of four distinct Web menu screens. The four screens included these combinations: (a) default font, double-spaced, (b) large font, double spaced, (c) default font, single spaced, and (d) large font, single spaced. Large font is defined as HTML "font=5." These screens were adapted for two additional conditions: long menus (scrolled) and short menus (not scrolled). The short menus were designed to be fully viewed on one screen without scrolling.

The content of the menus was selected to represent a fairly typical, but non-controversial, subject found on the Web; lists of endangered species (see Figure 1). Every screen had a title section in large type that said, "Some Endangered Species in North America." Under the title was a screen identification in a slightly smaller font which simply read "Screen A" or "Screen B," etc. A single line separated the title area from the menu itself. The short menu consisted of only four items (e.g., American Alligator, Atlantic Salt Marsh Snake) under the heading, "Reptiles." The longer (scrolled) menus had no headings. They listed a variety of endangered species in no particular order, neither alphabetical nor categorical. The 32 items in the scrolled menus were of varying length, from single words (e.g., Ocelot) to longer names (e.g., Carolina Northern Flying Squirrel). All screen backgrounds were white. The menu items appeared in the default blue color of the browser. All Web page borders were the default (gray) color.

Figure 1. EXAMPLE NOT SCROLLED WEB MENU



Data were collected in a computer laboratory setting that housed twenty 7000 series Power Macintosh computers with monitors set to standard resolution (640 x 480) and fifteen-inch viewing screens.

The ranking task was given to each class during the first 10 minutes of the class session. A script of instructions was read aloud to the subjects; then the ranking sheet and demographic data collection instrument were distributed. Due to concern regarding order of presentation of the menu combinations potentially influencing user ranking, four URLs were created. Each URL contained four screens presenting all combinations of font size and line spacing in either the scrolled or not scrolled condition. Order of screen presentation varied in each URL for both conditions scrolled and not scrolled. Students were randomly assigned a URL by distributing color-coded ranking instruments that designated a specific URL (set of four menu screens) to view. The students were instructed to open Netscape Navigator and enter the URL noted on their ranking sheet. Subjects were given five minutes to view the screens and rank their preferences on the ranking sheet. At the end of five minutes, the researcher collected the sheets and the subjects were thanked for their participation.

Results

Student preferences and frequency data were compiled for first, second, third, and least preferred menu styles for each condition (scrolled and not scrolled). The results reported here are descriptive in nature and reflect the characteristics of the preservice teacher research sample.

The first research question asked whether font size or line spacing would affect user preference in a not scrolled menu list displayed as a Web menu. Of the 80 students who viewed the not scrolled menus, 60% selected the menu with a large font and double line spacing as their favorite, 33% selected a large font with a single spaced menu, only 8% preferred the default font size whether part of a single spaced menu (5%) or a double spaced menu (3%). Second favorites (ranked number two) continued the preference for a large font size with 28% preferring the large font size, double spaced and 56% preferring the large font size, single spaced. Conversely, the least preferred (ranked number four) not scrolled menu display was the single spaced, default font size. Eighty-five percent selected this as their least preferred choice. These results indicate a strong preference for a large font size over the default font size for Web menus. The results of viewer preferences for single or double spacing are less conclusive. Refer to Table 1 for a summary of frequencies and percentages of student rankings of the not scrolled menu options.

The second research question investigated whether font size or line spacing would affect user preference in a scrolled menu list displayed as a Web menu. First choice preferences of the 105 students who viewed the scrolled menus resulted in 50% who selected a menu with a large font and double line spacing; 28% selected a large font with single line spacing; only 12% preferred the default font double spaced and 10% preferred the default font single spaced. For students who ranked the scrolled menus, large font continued to be the most preferred choice regardless of spacing. Forty-four percent of the students selected the large font single spaced as their second favorite menu; 21% selected the large font double spaced; 25% selected default font double spaced; and only 10% selected the default font single spaced. The fourth preference clearly indicated the default font single spaced menu was the least favorite with 64% ranking this choice as their least favorite. Although the overall preferences identified for scrolled menus reflected the same patterns of choice found in the not scrolled menus, the preferences were less pronounced than for the not scrolled menus. Refer to Table 2 for a summary of frequencies and percentages of the student rankings for the scrolled menu options.

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Table 1

FREQUENCIES AND PERCENTS OF PREFERENCES IN FONT SIZE AND LINE SPACING IN A NON SCROLLED CRT DISPLAYED WEB MENU

	Most Favorite		Second Favorite		Third Favorite		Fourth Favorite	
	Freq	%	Freq	%	Freq	%	Freq	%
Default Font Double Spaced	4	5%	12	15%	56	70%	8	10%
Large Font Double Spaced	48	60%	22	28%	7	9%	3	4%
Default Font Single Spaced	2	3%	1	1%	9	11%	68	85%
Large Font Single Spaced	26	33%	45	56%	8	10%	1	1%
Totals	80	101%*	80	100%	80	100 %	80	100%

*Rounding error

Table 2

FREQUENCIES AND PERCENTS OF PREFERENCES IN FONT SIZE AND LINE SPACING IN A SCROLLED CRT DISPLAYED WEB MENU

	Most Favorite		Second Favorite		Third Favorite		Fourth Favorite	
	Freq	%	Freq	%	Freq	%	Freq	%
Default Font Double Spaced	13	12%	26	25%	56	53%	10	10%
Large Font Double Spaced	52	50%	22	21%	14	13%	17	16%
Default Font Single Spaced	11	10%	11	10%	16	15%	67	64%
Large Font Single Spaced	29	28%	46	44%	19	18%	11	10%
Totals	105	100%	105	100%	105	99%*	105	100%

*Due to rounding

Discussion

This study investigated font size and line spacing for Web menus. Results clearly indicate that users prefer large fonts whether presented in a scrolled or not scrolled Web menu. Double line spacing was preferred over single line spacing in both scrolled and not scrolled treatments. The combination of default font and single line spacing was overwhelmingly ranked as least preferred in both the scrolled and not scrolled conditions.

A limitation of this study is its generalizability to alternative settings. The subjects of this study were a homogenous group of undergraduate students with the shared computer experience of educational technology classes. Replication of this study with subjects outside of the university environment is recommended.

Additionally, the reader is cautioned to note that these data reflect user preferences and may or may not affect the users' ability to learn from Web-based environments or increase their Web searching efficiency. Additional research is recommended to investigate the variables of font size and line spacing in Web environments designed for instructional purposes.

Another aspect of this study that deserves further exploration is the potential connection between user preference and user motivation. Keller and Burkman (1993) state, "The rapidity of change in both technical knowledge and cultural perspectives leads to increasing demand for ongoing education. The motivation to learn impacts on both the effectiveness and the efficiency of instruction" (p. 49). With the increasing emphasis on Web-based systems to deliver that instruction, it is imperative that instructional designers and Web developers understand the relationships between preferences, motivation, and learning. This study provides a foundation for further exploration of these relationships.

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